1. In 1990, a sum of $1000 is invested at a rate of 6% per year for 15 years.

   a. What is the growth rate (ie: the value for "b")?

   b. What is the initial amount?

   c. Write an equation that models the growth of the investment, and use it to determine the value of the investment after 15 years?

2. A species of bacteria has a population of 500 at noon. It doubles every 10 hours. The equation that models the growth of the population, P, at any hour, t, is $P = 500(2)^{\frac{t}{10}}$.

   a. Why is the exponent $\frac{t}{10}$?

   b. Why is the base 2?

   c. Why is the multiplier 500?

   d. Determine the population at midnight?

   e. Determine the population at noon the next day?

3. Which of these functions describe exponential decay? Explain.

   a. $y = -4(3)^x$

   b. $y = 0.8(1.2)^x$

   c. $y = 3(0.8)^{2x}$

   d. $y = \frac{1}{3}(0.9)^{\frac{x}{2}}$

4. A town with a population of 12000 has been growing at an average rate of 2.5% for the last 10 years. Suppose this growth rate will be maintained in the future. The equation that models the town's growth is $P = 12000(1.025)^n$ where P represents the population and n is the number of years from now.

   a. Determine the population of the town in 10 years.

   b. Determine the number of years until the population doubles.

5. In each case, write an equation that models the situation described. Explain what each part of each equation represents.

   a. The percent of colour remaining if your blue jeans lose 1% of their original colour every time they are washed.

   b. The population if a town had 2500 residents in 1990 and grew at a rate of 0.5% each year after that for t years.

   c. The population of a colony if a single bacterium doubles every day, what is the population P after t days.

6. A population of yeast cells doubles every hour. Assume an initial population of 80 cells.

   a. Write an equation that can be used to determine the population of cells after t hours.

   b. Use your equation to determine the population after 6 hours.

   c. Use your equation to determine the population after 90 minutes.

   d. Approximately how many hours would it take for the population of cells to reach 1 million.

7. A collector's hockey card is purchased in 1990 for $5. The value increases by 6% every year.

   a. Write an equation that models the value of the card, given the number of years since 1990.

   b. Determine the value of the card in the 4^{th} year after purchase

   c. Determine the value of the card in the 2010.

8. Light intensity in a lake falls by 9% per meter of depth relative to the surface.

   a. Write an equation that models the intensity of light per meter of depth. Assume that the intensity is 100% at the surface.

   b. Determine the intensity of light at a depth of 7.5 meters.